MicroRNA-9 coordinates proliferation and migration of human embryonic stem cell-derived neural progenitors.

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Public Summary:

Scientific Abstract:
Human pluripotent stem cells offer promise for use in cell-based therapies for brain injury and diseases. However, their cellular behavior is poorly understood. Here we show that the expression of the brain-specific microRNA-9 (miR-9) is turned on in human neural progenitor cells (hNPCs) derived from human embryonic stem cells. Loss of miR-9 suppressed proliferation but promoted migration of hNPCs cultured in vitro. hNPCs without miR-9 activity also showed enhanced migration when transplanted into mouse embryonic brains or adult brains of a mouse model of stroke. These effects were not due to precocious differentiation of hNPCs. One of the key targets directly regulated by miR-9 encodes stathmin, which increases microtubule instability and whose expression in hNPCs correlates inversely with that of miR-9. Partial inhibition of stathmin activity suppressed the effects of miR-9 loss on proliferation and migration of human or embryonic rat neural progenitors. These results identify miR-9 as a novel regulator that coordinates the proliferation and migration of hNPCs.